

INDUSTRIAL IONIZING RADIATION

43D MDOS/SGOAM

Ext. 4-2571



Ionizing Radiation, Industrial Strength

Overview:

- Definitions
 - Ionizing Vs. Nonionizing Radiation
 - X-Rays & Gamma Rays
- Uses in Nondestructive Inspection
- Workplace Exposure & Prevention
- Health Effects
- Monitoring: Dosimeters & OHM Exam



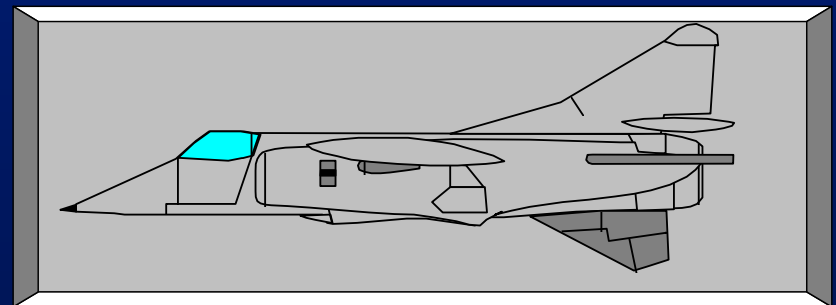
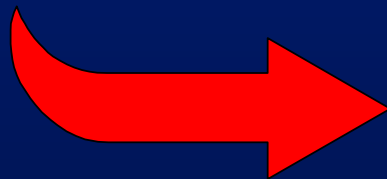
Ionizing Radiation Terms

- Energy transfer that strips electrons off of whatever that energy hits.
- X-Rays: Radiation made by an X-Ray machine using electricity (on / off)
- Gamma Rays: Radiation made by an element source (continual)
 - ex: Iridium 192 and Kryptonite
- Rads, Rems and Sv = units of measure



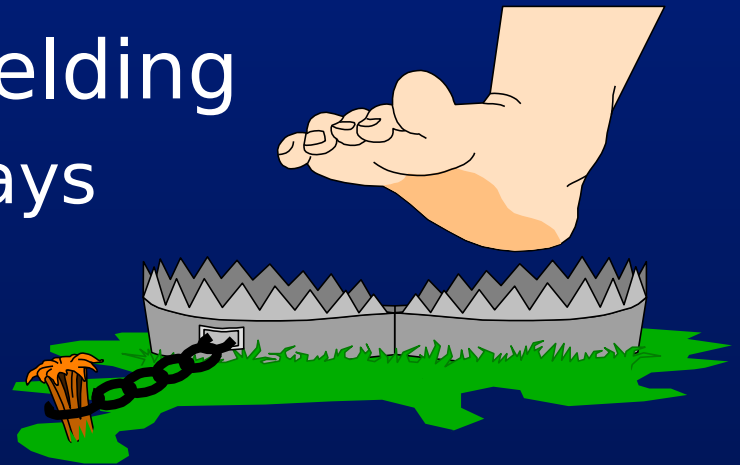
Nondestructive Inspection: X-Rays or Gamma Rays

- Examine metal objects: Airplanes, Rockets, welds, casting, forgements.
- Radiation - Object - Film/Screen
- Result: Two-dimensional 'picture'



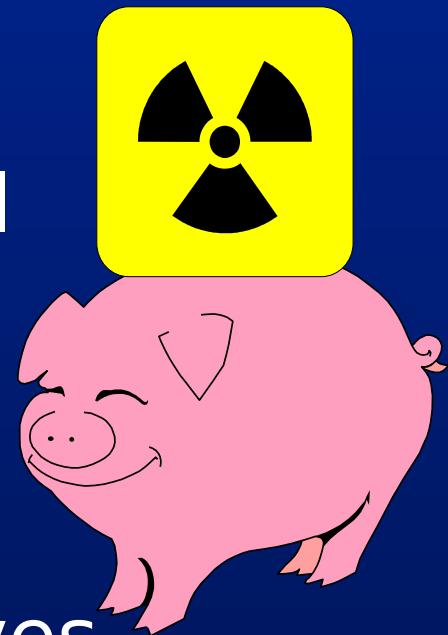
Workplace Radiation Hazards

- Are you safe as long as you don't stand directly in front of the source?
 - NO.
 - Stray radiation ("Scatter")
- Time, Distance, Shielding
 - X-Rays & Gamma Rays
- Electricity
 - X-Ray Machine



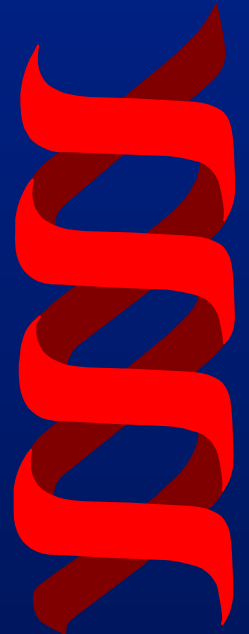
Preventing Exposure:

- Time, Distance, Shielding
- CONTROLLED AREA
- Operated by Remote Control
 - 75 Feet Away
 - Camera
- Source Capsule “Pig”
- Leaded Apparel: Apron, Gloves, Glasses, Thyroid Shield



Health Effects of Radiation

- Target = Rapidly dividing body cells
 - Blood Cells
 - Reproductive Cells
 - Intestinal Cells
 - Thyroid Gland
- Acute Vs Long-Term exposure
 - Radiation Sickness (Acute)
 - Cancer, Cataracts, Birth Defects (Chronic)

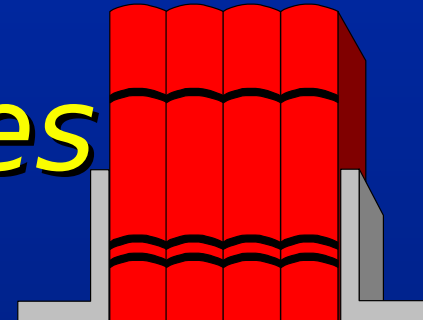


Ionizing Radiation: Amount

- How much is considered “acceptable”?
 - Differs with age
 - Differs by body part irradiated
 - » Skin of hands
 - » Thyroid gland
- **Whole Body Dose, Adult: 5 rem/year**
- Pregnancy: 0.5 rem/pregnancy
 - Monthly Monitoring
 - 0.05 rem/month



Radiation Guidelines



- OSHA, State Laws
- ANSI
- US Nuclear Regulatory Commission
- National Council of Radiation Protection & Measurements
- International Commission on Radiological Protection
- Department of Defense

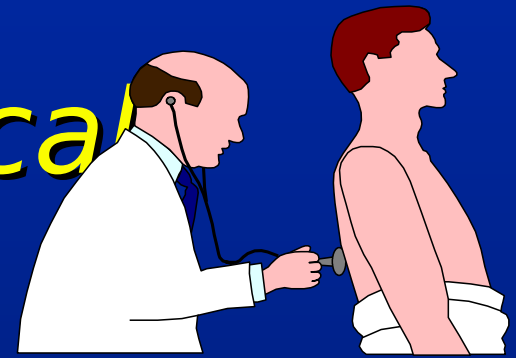


Monitoring: Dosimeters --

- Quarterly or Monthly Readings
- Worn UNDER Lead Apron/Shield
- Main Type of Dosimeter: **TLD**
(Thermoluminescent Dosimeter)
- Other Types:
 - **Pocket Dosimeter** - Immediate Reading
 - **Audible Alarm Dosimeter** “Chirper”
 - **Film Badge** - Delayed Reading



Monitoring: Medical Examinations



- Initial Exam & Past Medical History
- Annual Exam
 - History and Mishap Record
 - Complete Blood Count
 - Eye Exam (Cataracts)
 - Physical: Particularly Skin & Fingertips
- End of Employment Exam



Industrial Strength Ionizing Radiation, Summary:

- Definitions
- Uses in Nondestructive Inspection
- Workplace Exposure & Prevention
- Health Effects
 - Chronic Effects
 - Acute Radiation Sickness
- Monitoring: Dosimeters & Exams



Ionizing Radiation, Industrial Strength

Main Points:

- Time, Distance and Shielding
- Electrocution
- Pregnancy: Notify MD, PH and Supervisor
- Chronic Exposure (Cancers)
- 5 rems/year (0.05 Sv/year)
- Dosimeters and Medical Exams





The End

For Additional Information,
Contact the Public Health
Office

4 - 2751